Cuts and Triggers in Y2004

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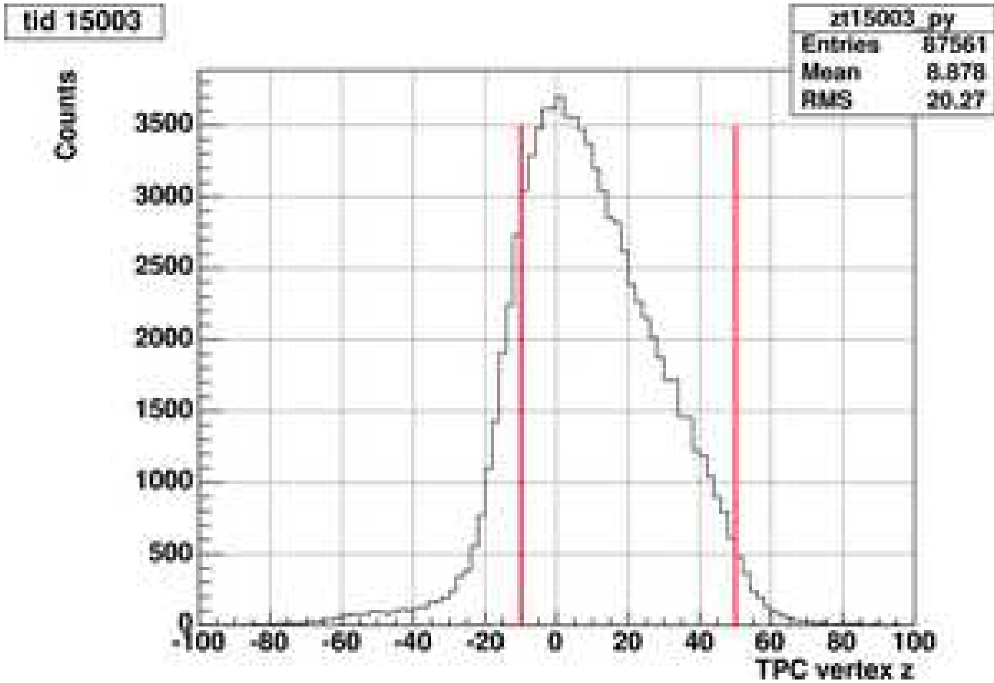
Triggers

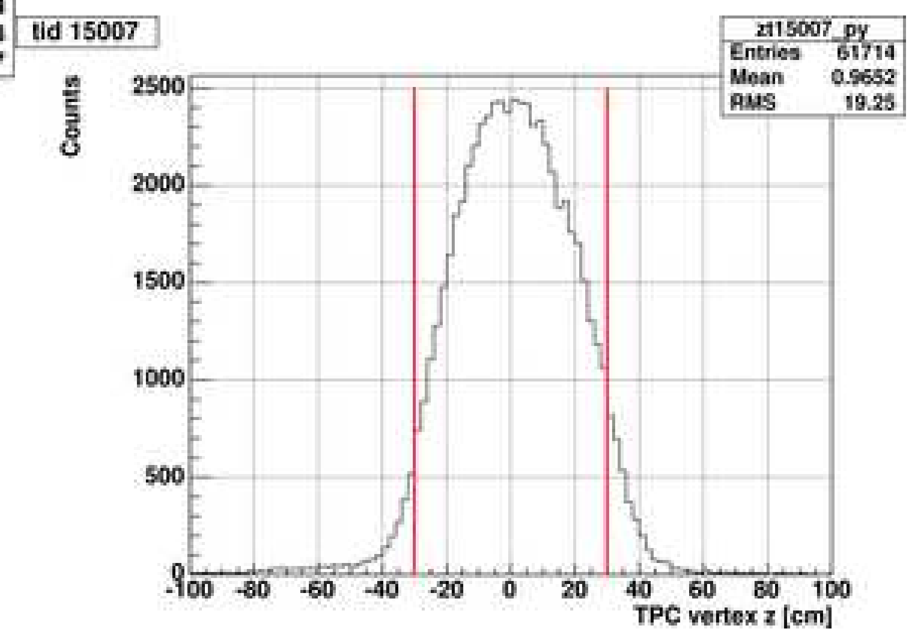
- Running document
  - http://www.star.bnl.gov/protected/common/common2004/trigger2004/triggers2004.html
  - Or linked from the ALL page
    - STAR->Physics->Related Links->All
- Main trigger id’ s (some extra calibration triggers)
  - “ Minbias” 15003 or 15007 – target: 50M
  - “ Central” 15105 – target: 30M
  - “ High tower” 15203, 15211 – target: 10M
    - (10e6 events/1e5 ub=~100 ub^{-1})
- Main trigger setup names
  - productionMinBias – mostly 15003 or 15007
  - productionHigh, Mid, Low – changing mix of main triggers w/ prescales tuned to optimize for luminosity

History of minbias

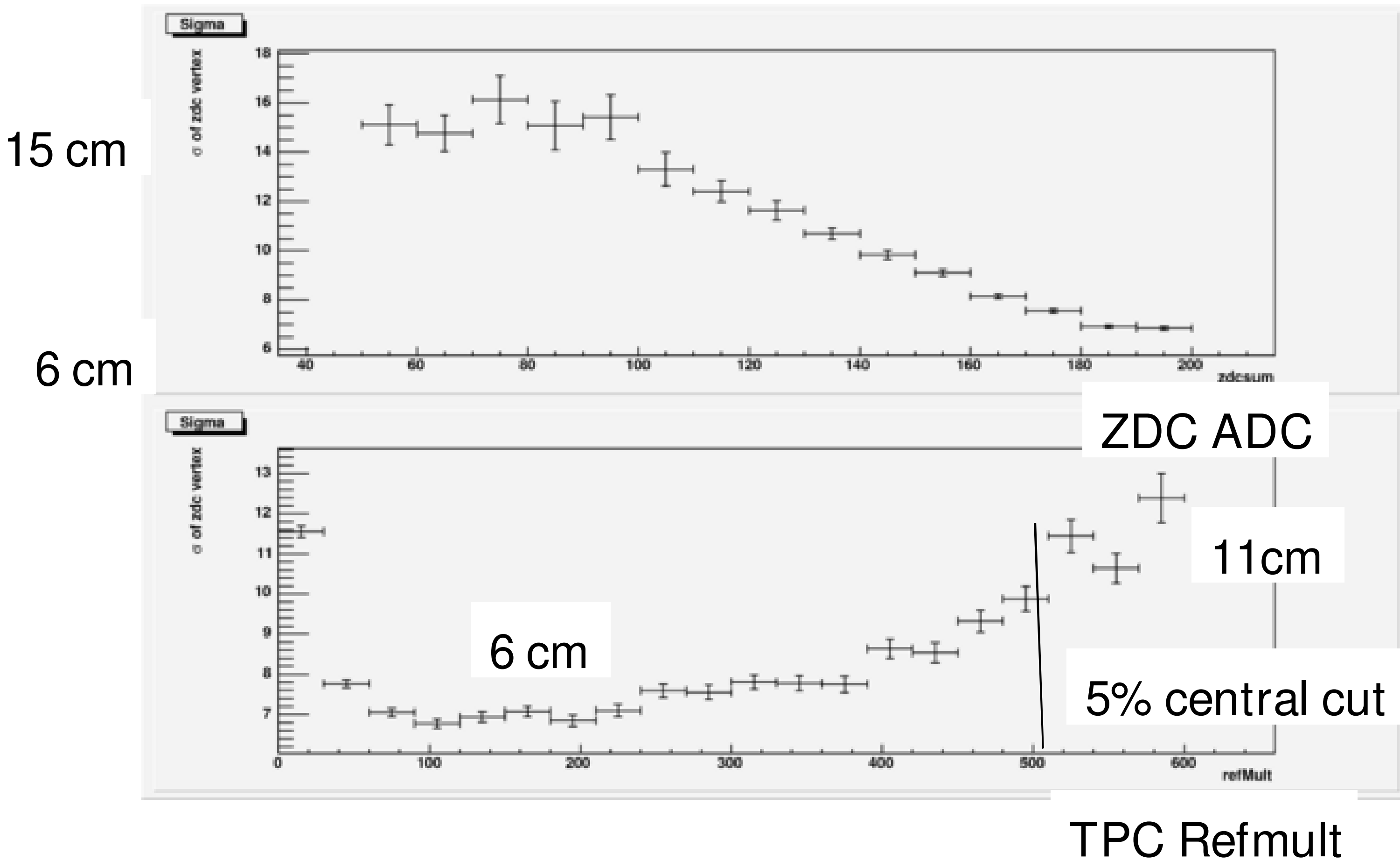
- Early in run: ZDC vertex cut offset from 0
- TID 15003
- Allowed: ~-10 < vz < 50 cm
- ~10M events with this cut



- Later in run (after day 23): fixed offset
- TID 15007
- Allowed: ~-30 < vz < 30 cm



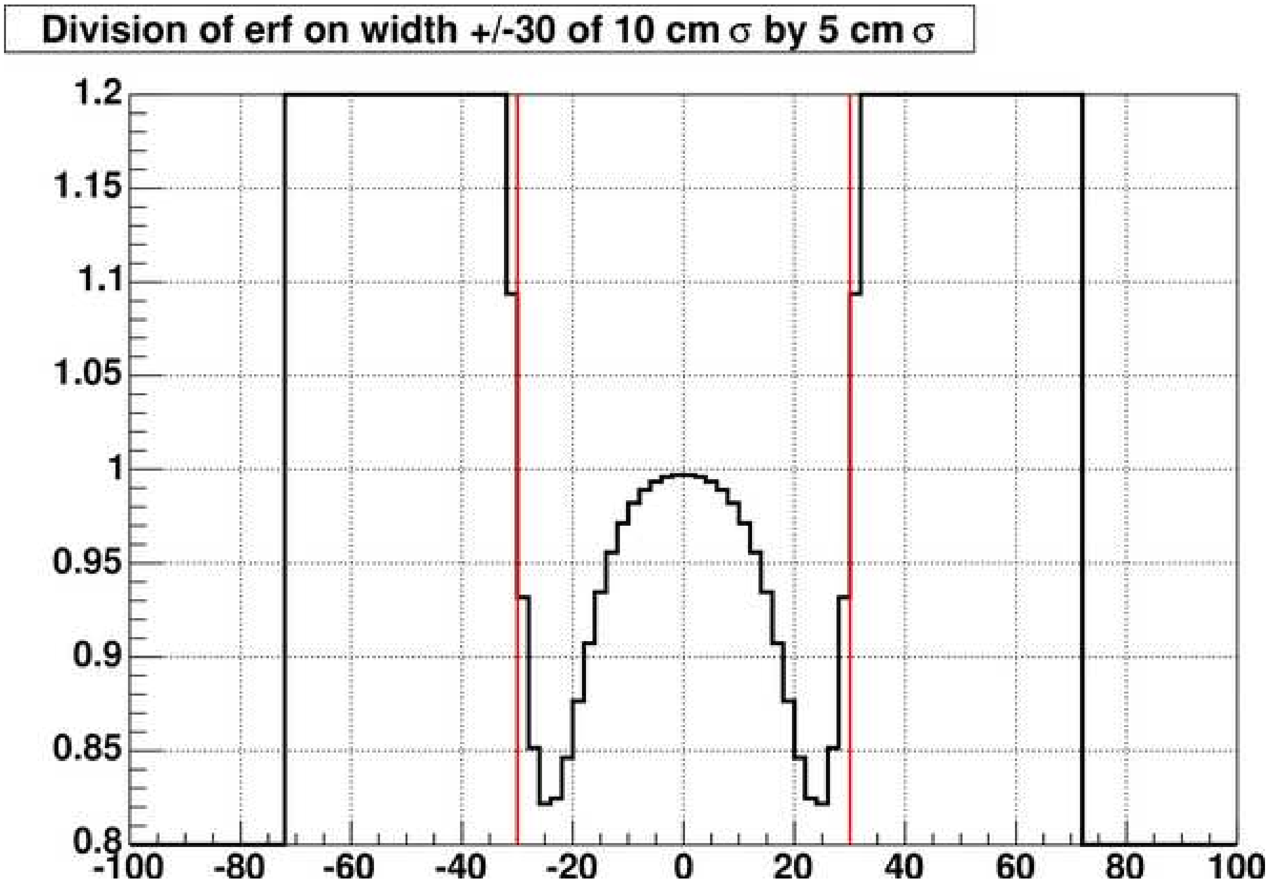
ZDC vertex cut: usability



ZDC vertex z resolution dependent on centrality

Leads to centrality bias for fixed cut on ZDC timing

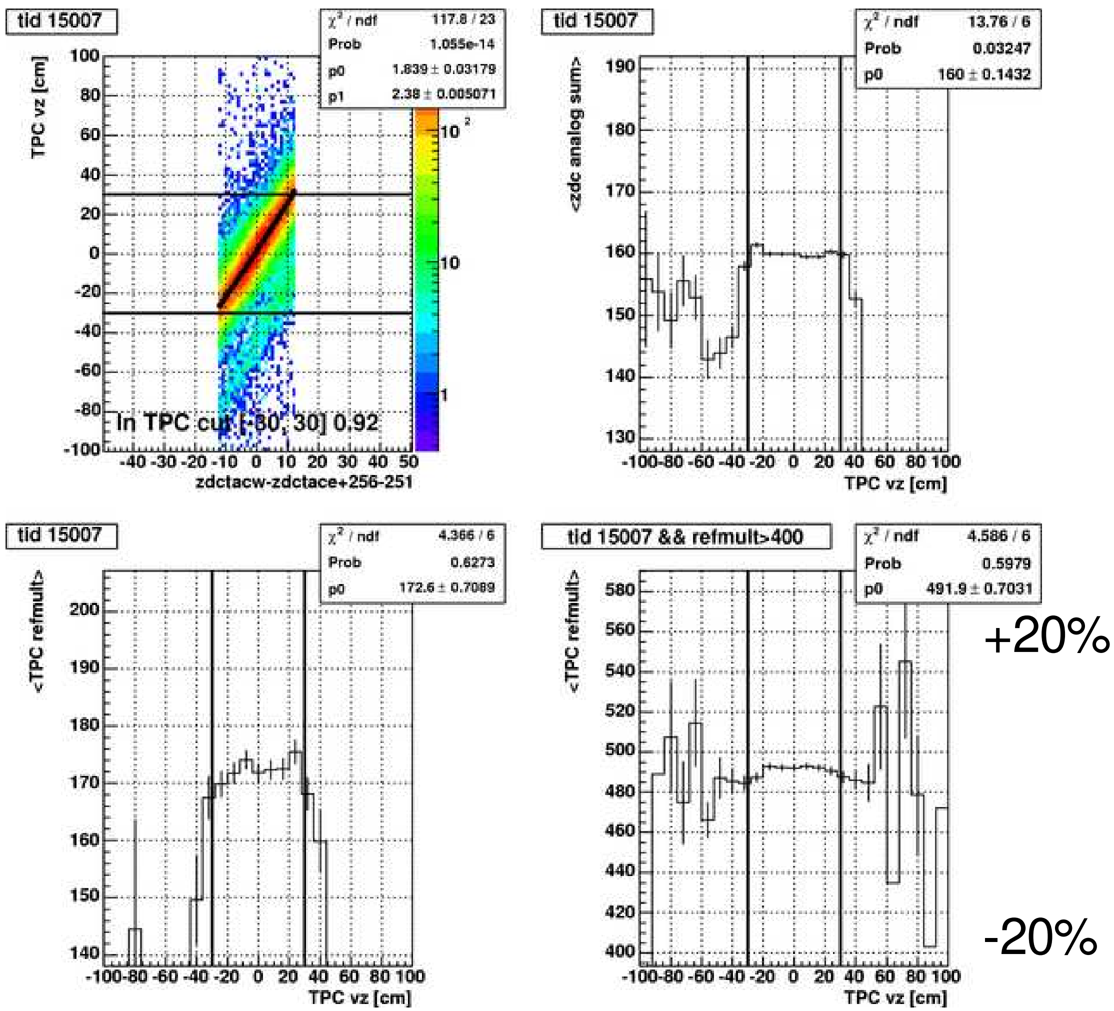
Model: effect of changing resolution



Take two foldings: +/- 30 cm square wave + 5 and 10 cm gaussian

Divide the two: maximal effect within cuts is ~15%, overall few %

Measured: cut placement



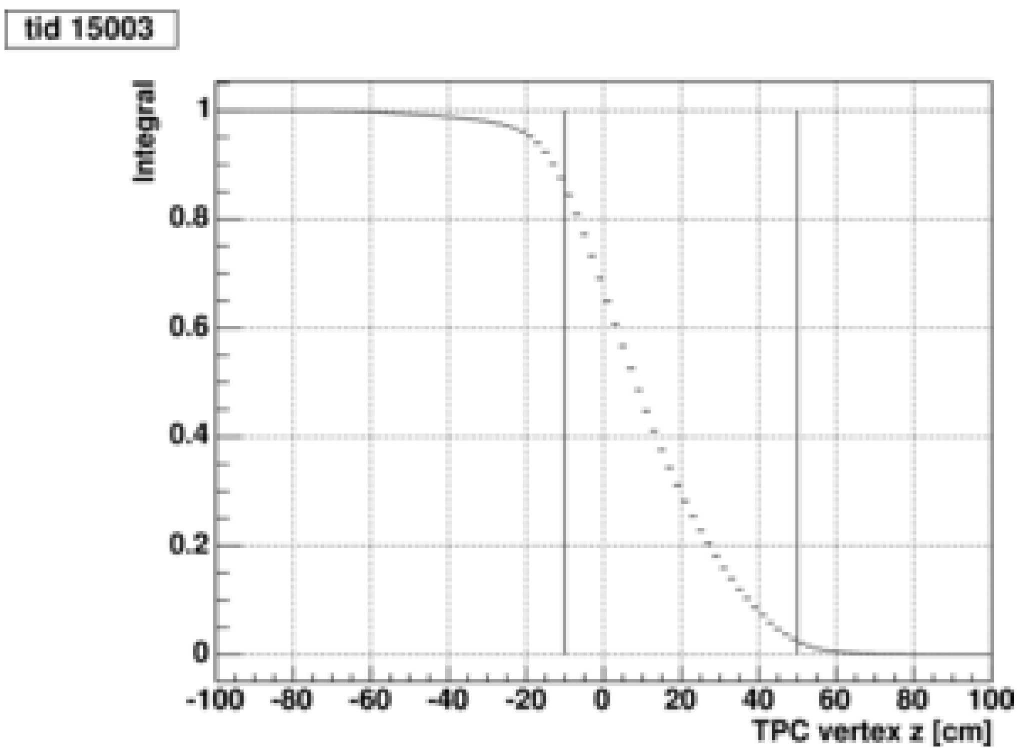
For trigger id 15007:

Cut at +/- 30

Bias in <zdc>, <refmult> at few % level within cuts, Large outside cuts

~90% of triggered events within cut

Offset vertex trigger id 15003



Bias requires cut within

-10 < vz < 50 cm

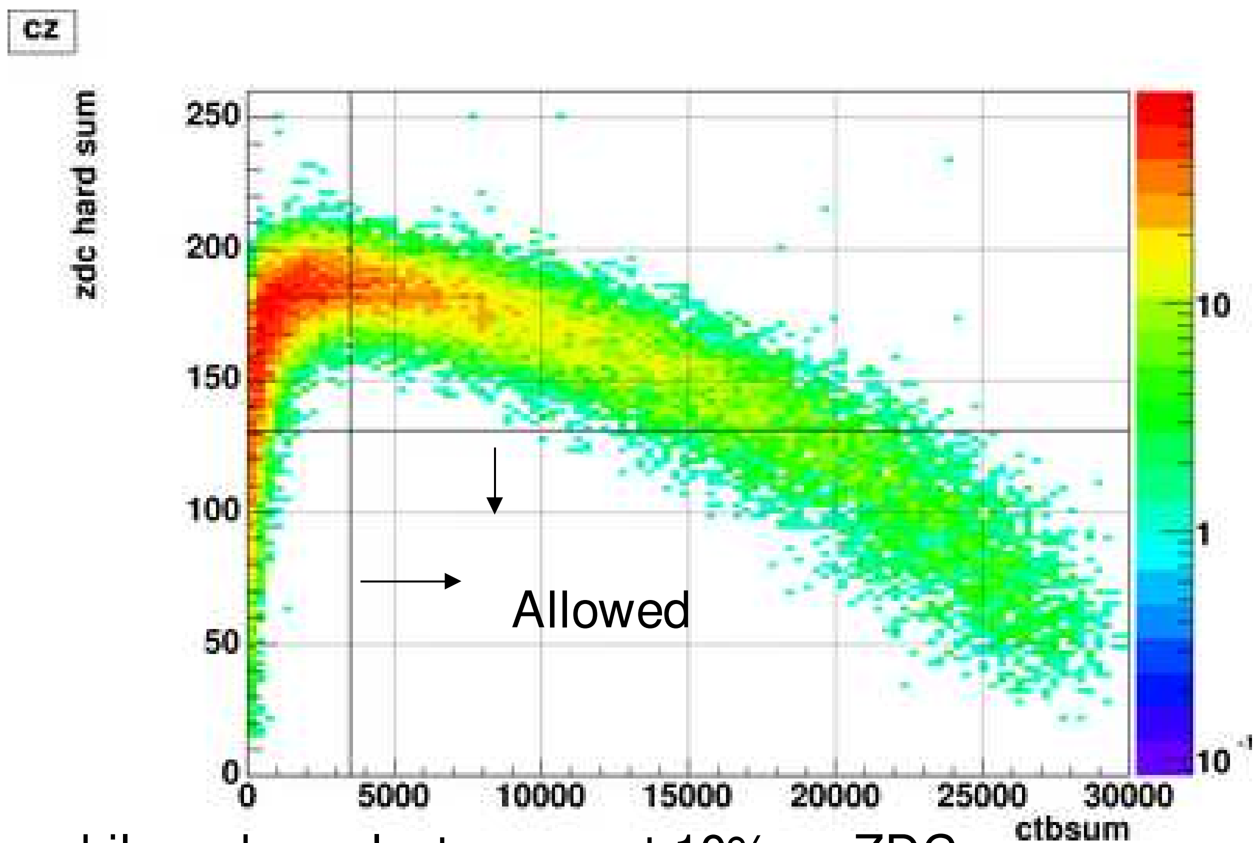
~80% of triggers

However: other requirements will probably lead to 30 cm cut: Additional loss of ~10-15%

Minbias: summary of usability

- Additional cut: ctb multiplicity > 75
  - Removes UPC-type events
  - Loses ~7% of the cross-section with vertices
  - As in y2: “ minbias” only usable out to 80% central, biased for more peripheral events due to fuzzy CTB edge
- Usability ~75%
  - 10% loss from vertex bias
  - ~7% loss from non-reconstructed vertices
  - ~13% loss from extremely peripheral events

Central trigger



Same philosophy as last year: cut 10% on ZDC

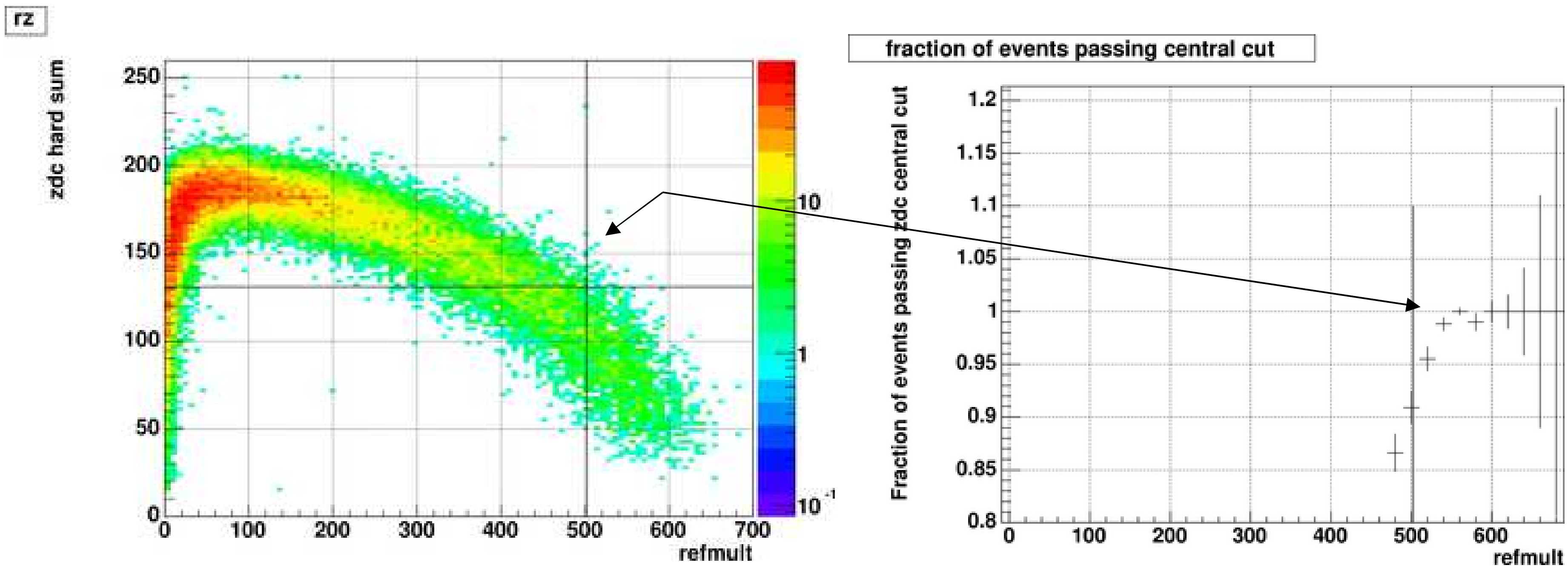
Usability:

Option 1: make 10% central cut on ZDC: 100% usable

Option 2: make 5% TPC mult cut: 50% usable

BBC vertex cut: no dependence of resolution on multiplicity, 100% usable

Check of central trigger bias



Small (~5%) loss of events at the lowest multiplicity

0.1% effect on <refmult>

Acceptable bias.

In order to gain back the extreme edge would have to increase ZDC cut to ~15%, drop usability

High tower triggers

- ~1M triggers taken with 50% central cut on CTB: usable for ~0-40% central
  - TID 15202 (barrel), 15210 (EMC)
- Fixed day 42: base is real minbias + TID changed (tid’s 15203, 15210)
- There are some 15007 trigger id’s (~800k) w/ 50% central cut. Breaks the model of trigger id having same meaning forever. Working on method to mark these.

Uniform Cuts

- As always, there are enough changes w/ time that there could be confusion
- Investigation of centrality cuts ongoing
  – New tracker, calibrations, etc. -> new values for TPC refmult cut
  – FTPC: in for significant fraction of data, but also out for a significant fraction of data. Advantage: large separation in pseudorapidity + well modeled (i.e. dAu)
- Option: come up with standard piece of code/tag in place at time of production